The Bering Sea: Current status and recent events

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Dr. Jeffrey (Jeff) Napp is a Biological/Fisheries Oceanographer at the Alaska Fisheries Science Center of NOAA-Fisheries. He is Head of the Recruitment Processes Program at the Center and co-leader (with Dr. Phyllis Stabeno) of NOAA's Fisheries Oceanography Coordinated Investigations (FOCI). His own research is focused on physical and biological processes at lower trophic levels that affect recruitment variability in fish populations. He is active as Principal Investigator in both Bering Sea (NOAA's Bering Sea FOCI, Southeast Bering Sea Carrying Capacity) and Gulf of Alaska (FOCI, GLOBEC) Programs, and currently serves on a steering committee to organize a U.S. science initiative for the Bering Sea (BEST: Bering Sea Ecosystem STudy). Jeff participates in several PICES Working Groups and Technical Advisory Panels.

First of all, many thanks to Dr. Phyllis Stabeno of NOAA/PMEL for being the first scientist to write the PICES Bering Sea status reports. I hope to continue providing the PICES community with topical information as she did for many years.

My strategy will be to act as a reporter summarizing newsworthy information on the current status of the Bering Sea, as well as, the status of research and research programs focused on that region. The intent is to stimulate discussion both about what is presently happening in the Bering Sea and how best to study it. My goal is to present information (scientific, anecdotal, and traditional knowledge) that encompasses the scope of interest of PICES member countries. This means east and west, north and south Bering Sea, and the four disciplines into which PICES science is categorized: physical oceanography and climate (POC), biological oceanography (BIO), fishery science (FIS) and marine environmental quality (MEQ). To do this I will need your help. The Bering Sea is large and its component ecosystems are so different that it is hard for one person to know all that is happening. If you have observations about the Bering Sea that you think are noteworthy, then please send them to me at the above address. I will do my best to include in the status report as much of the submitted information as possible. I will also include a footnote in each article crediting those whose submissions are used.

Recent observations

The Pacific Decadal Oscillation has recently shifted from a short period of negative phase to the positive phase (Fig. 1). This change has not immediately led to a change in the recent trend in warmer winter water temperatures in the Bering Sea. There has been a conspicuous absence of winter sea ice in the southeast Bering Sea in recent years.

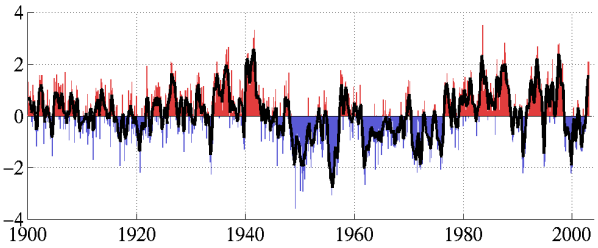

Fig. 1 Pacific Decadal Oscillation Index, 1900 – 2003. Source: http://tal.atmos.washington.edu/pdo.

In addition, the 2002/2003 equatorial El Niño appears to be influencing (through atmospheric teleconnections) the eastern Bering Sea. Last summer's water column heat content was as high or higher than that measured during the 1997/98 event (Fig. 2 top). At the start of fall the water column was much warmer than most years (Fig. 2 bottom). Subsequently, for the first time, thermal stratification was observed over the Middle Shelf Domain in February 2003.

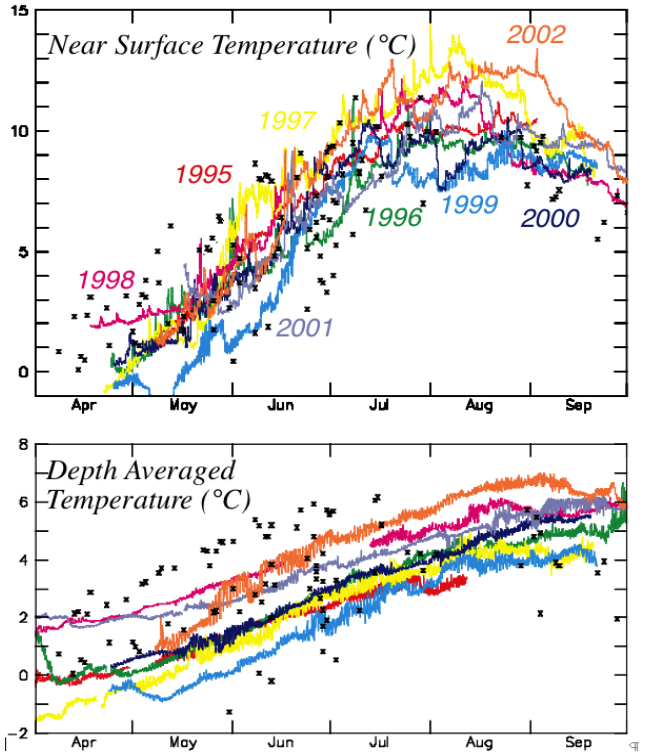

Fig. 2 Comparison of daily near surface (upper panel) and depth averaged (lower panel) water temperatures of the SE Bering Sea Shelf, 1995 - 2002. Water temperatures measured at mooring Site 2 (see PICES Press Vol. 10 (2), p. 15, Fig. 3). Data from hydrographic surveys between 1966 and 1994 shown as Xs.

Spring in Alaska appeared to start several weeks earlier than usual; high pressure atmospheric systems were present over the Bering Sea and Gulf of Alaska during the first part of May, and April air temperatures in Anchorage, Alaska, were higher than long-term maxima recently set during the 1997/1998 El Niño. Although storms did transit the region, several scientists on the water during spring made note of the unusually calm conditions.

The coccolithophore bloom, which first appeared during the 1997/1998 El Niño, failed to re-appear in the summer of 2001. Reports from at least three platforms (T/S *Oshoro Maru*, R/V *Alpha Helix*, and Dr. Vera Alexander aboard a cruise ship) were negative. Dr. Sei-ichi Saitoh onboard the T/S *Oshoro Maru* received satellite images which indicated a bloom, but when he arrived on the station, there were no coccolithophores. Another research cruise (Whitledge, Flint, Lessard and Napp) did find coccolithophores actively growing in the late summer of 2001, but at densities too low to discolor the water. To my knowledge, there have been no reports of a bloom in the summer of 2002. Will the bloom re-appear in the summer of 2003? Stay tuned for the next Bering Sea report.

Demonstrating the effect of climate on lower trophic levels has proven to be very difficult for the eastern Bering Sea shelf. Sugimoto and Tadokoro (*Fish. Oceanogr.*, 1997, Vol. 6, pp. 74-93) demonstrated low frequency variation of chlorophyll and zooplankton standing stock for the eastern Bering Sea (> 150 m water depth) using the T/S *Oshoro Maru* data set (Hokkaido University). A re-analysis of this data set for the eastern shelf was unable to show long-term effects or the influence of El Niños (Fig. 3).

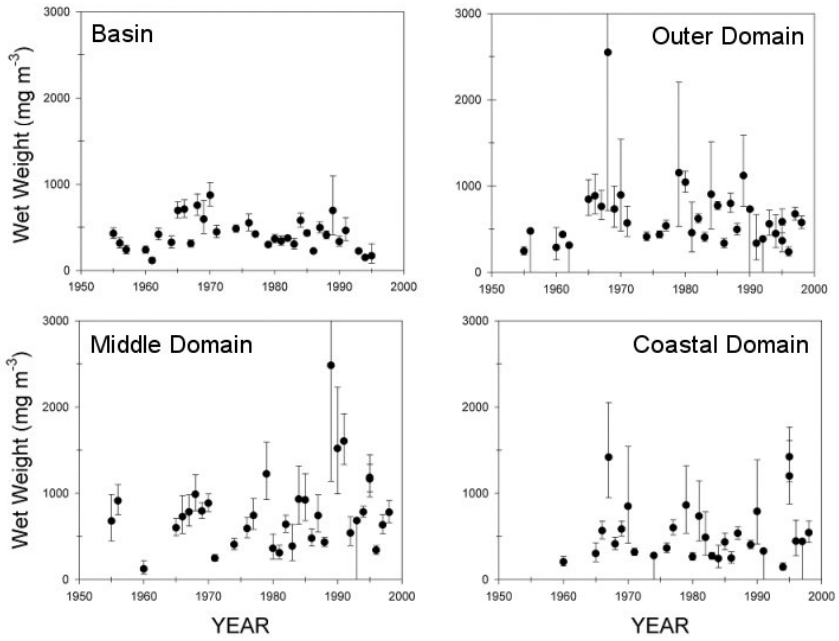

*Fig. 3 Changes in summer zooplankton biomass (means with standard errors) in the southeastern Bering Sea. Figure from Hunt et al. (*Deep-Sea Res. Part II, *2002,Vol. 49, No. 26, pp. 5821-5853).*

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